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ABSTRACT

Natural polysaccharides have widespread applications in drug formulations as a result of their biodegradability, biocompatibility, and lower cost. However, the effective use of polysaccharides has very often been hindered by low solubility, inconsistent viscosity and stability. Chemical modification, in particular graft copolymerization, is one way to avoid these disadvantages and improve their performance characteristics.

In this study, jute leaf polysaccharide (JLP) is isolated and then modified by microwave-assisted graft copolymerization with methacrylamide to give grafted JLP (G-JLP). Both native and grafted polysaccharides were characterized by several methods, including FTIR, DSC, TGA-DTA, SEM, XRD, 13C-NMR and zeta potential analysis to confirm structural modification and improved physicochemical properties.

Diclofenac sodium was selected as the model drug for the sustained release matrix tablets which were prepared by wet granulation with JLP, G-JLP and a commercial polymer HPMC-K15. Physical parameters such as hardness, friability, weight variation and drug content were found to be within the limit for all tablets.

In vitro drug release testing suggested that tablets produced by G-JLP showed a delayed-release profile than those produced by JLP but similar to those from the traditional HPMC-K15. The drug release kinetics followed a zero-order model, demonstrating a controlled-release process by both matrix erosion and diffusion. Stability on accelerated conditions performed in the chosen formulation confirmed that it was stable for a longer time without any change in the drug content and any degradative changes in the tablet.

This study supports the potential of the methacrylamide-grafted jute leaf polysaccharide as a natural and potentially effective release-retardant polymer in sustained release drug delivery systems and potentially good alternative to synthetic polymers.